RF Exposure Report

Report No.:	SABFBE-WTW-P21031123
FCC ID:	I88DX4510-B0
Test Model:	DX4510-B0
Received Date:	Mar. 23, 2021
Test Date:	May 11, 2021
Issued Date:	Apr. 15, 2022
Applicant:	Zyxel Communications Corporation
Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
SABFBE-WTW-P21031123	Original release.	Apr. 15, 2022

1 Certificate of Conformity

Product:	AX6000 WiFi6 VDSL2 Bonding Gateway
Brand:	ZYXEL
Test Model:	DX4510-B0
Sample Status:	Engineering sample
Applicant:	Zyxel Communications Corporation
Test Date:	May 11, 2021
Standards:	FCC Part 2 (Section 2.1091)
	KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Vivian Huang , **Date:** Apr. 15, 2022

Vivian Huang / Specialist

Approved by : , **Date:** Apr. 15, 2022

May Chen / Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 22 cm away from the body of the user. So, this device is classified as **Mobile Device**.

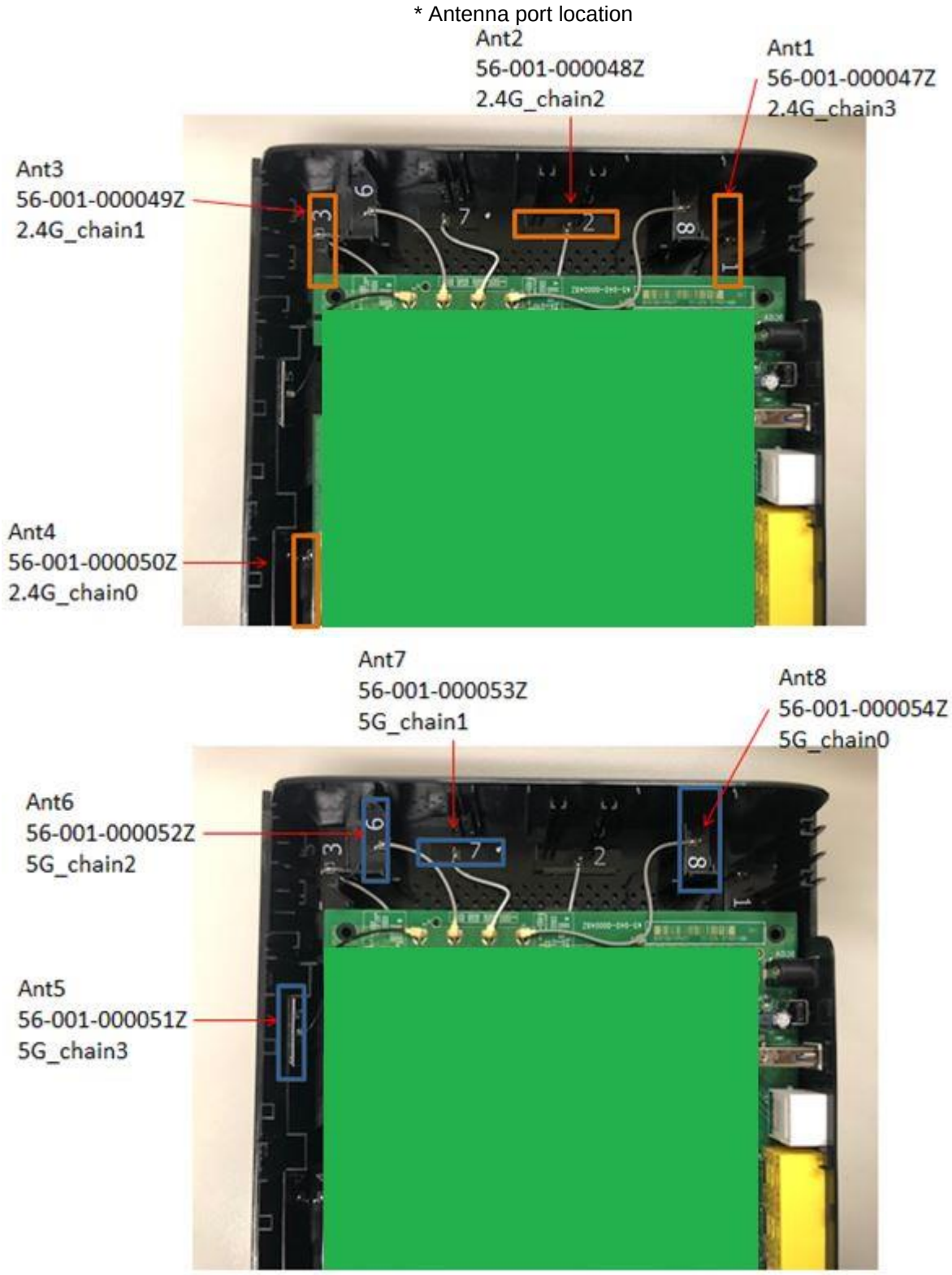
2.4 Antenna Gain

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	2.4G_Chain 3	WHAYU	56-001-000047Z	2.7	2.4~2.4835	Dipole	i-pex(MHF)	313
2	2.4G_Chain 2	WHAYU	56-001-000048Z	2.31	2.4~2.4835	Dipole	i-pex(MHF)	258
3	2.4G_Chain 1	WHAYU	56-001-000049Z	2.57	2.4~2.4835	Dipole	i-pex(MHF)	263
4	2.4G_Chain 0	WHAYU	56-001-000050Z	2.53	2.4~2.4835	Dipole	i-pex(MHF)	145
5	5G_Chain 3	WHAYU	56-001-000051Z	2.6 2.92 3.31 3.16	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	59
6	5G_Chain 2	WHAYU	56-001-000052Z	2.99 3.22 3.13 2.18	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	40
7	5G_Chain 1	WHAYU	56-001-000053Z	3.48 3.09 3.79 2.46	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	45
8	5G_Chain 0	WHAYU	56-001-000054Z	0.63 2.62 2.61 3.73	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	i-pex(MHF)	80

Note:

1. Antenna Gain refer to “P21031123 Multi-Antenna Systems Directional Gain measurement” files.
2. Maximum Correlated Directional Gain following KDB662911 D03 MIMO Antenna Gain Measurement.

* Antenna port location



Note: The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5 Calculation Result

CDD Mode

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Maximum Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
WLAN 2.4GHz	2412~2462	992.518	2.7	22	0.30387	1	Pass
WLAN U-NII-1	5180~5250	978.408	3.48	22	0.35848	1	Pass
WLAN U-NII-2A	5250~5320	247.677	3.22	22	0.08547	1	Pass
WLAN U-NII-2C	5500~5720	247.904	3.79	22	0.09755	1	Pass
WLAN U-NII-3	5745~5825	989.441	3.73	22	0.384	1	Pass

Beamforming Mode

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Directional Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
WLAN 2.4GHz	2412~2462	974.469	3.34	22	0.34571	1	Pass
WLAN U-NII-1	5180~5250	978.408	4.98	22	0.50637	1	Pass
WLAN U-NII-2A	5250~5320	247.677	4.28	22	0.1091	1	Pass
WLAN U-NII-2C	5500~5720	247.904	3.07	22	0.08265	1	Pass
WLAN U-NII-3	5745~5825	989.441	3.18	22	0.33833	1	Pass

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: The directional gain = 3.34dBi
   5GHz (U-NII-1): The directional gain = 4.98dBi
   5GHz (U-NII-2A): The directional gain = 4.28dBi
   5GHz (U-NII-2C): The directional gain = 3.07dBi
   5GHz (U-NII-3): The directional gain = 3.18dBi

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

CDD Mode

WLAN 2.4GHz + WLAN 5GHz = 0.30387 / 1 + 0.384 / 1 = 0.68787

Beamforming Mode

WLAN 2.4GHz + WLAN 5GHz = 0.34571 / 1 + 0.50637 / 1 = 0.85208

Therefore the maximum calculations of above situations are less than the "1" limit.

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